



## Solar Boston Initiative

*Increasing solar energy in Boston to 25 MW by 2015*

# Boston Resident Saves Money with New Cogeneration Technology

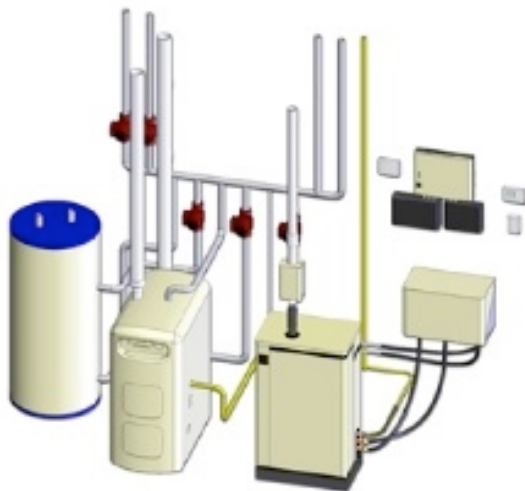
### Summary

Boston residents have many energy options for keeping their utility use – and bills – low. One of the lesser-known technologies available is the residential cogeneration system, also known as a combined heat and power (CHP) system, which uses a single unit to generate both heat and electricity.

Kyle Zick first learned about this technology three years ago. After watching oil prices rise steadily, Mr. Zick researched a number of natural gas systems and ultimately chose the Climate Energy Freewatt Cogeneration System for his 3,000 square foot home in Roslindale, MA. His system was installed in September 2008 for a total of \$19,000 after \$2,000 of rebates from National Grid's Energy Efficiency Program.

### Cogeneration: The Ultimate Energy Efficiency

The Climate Energy Freewatt System, a CHP system that uses a generator manufactured by the Honda Motor Company, provides an overall energy efficiency of 83-90%, helping to lower energy costs.



A Freewatt Cogeneration System (hydronic).

Source : <http://www.freewatt.com/>

Kyle Zick's cogeneration system consists of a natural gas-based electricity generator and a natural gas-based boiler that ties into his hydronic heating system and replaced his oil-fired boiler, as shown in the diagram to the left. The generator and the boiler work together to heat the house while the generator provides electricity. The generator is similar to those used for backup power during outages.

The cogenerator is a quiet, long-life small engine design. The engine runs entirely on natural gas (propane available in April 2009) and can be located in a basement or utility room. The cogenerator can tie into any existing hot water or forced air system. This engine produces 1,200 watts of electric power and about 12,000 BTUs/hour of heat for the home. (Source: <http://www.freewatt.com/>)

A cogenerator runs more efficiently than common electricity and heating systems; coal-fired power plants are generally 35% efficient because much of the energy from the coal combustion process is wasted as heat, while the cogenerator has an 85% efficiency on average because it captures the waste heat from combustion and uses it to heat the home. It also runs much cleaner than centralized coal plants because of the low emissions produced by the cleaner natural gas, and because the energy is produced on site – rather than transferred over hundreds of miles of transmission wires. The result is a reduction in carbon dioxide emissions and a huge increase in efficiency.

### The Zick Home Example

Climate Energy installed the cogeneration system shown to the right. The project cost included managing all aspects of the project: permitting, plumbing, electrical work, and installation.

In the basement, the generator runs almost all the time, maximizing the electrical generation and maintaining the heated water temperature in the radiators longer.

Instead of the radiator temperatures fluctuating from 160 degrees to 55, the water in the boiler, with help from the generator, can be maintained at around 80 degrees. This keeps the house's air temperature comfortable throughout the day.



*"It maintains heat in the house longer, adding comfort."* –Kyle Zick

Mr. Zick estimates payback on the \$19,000 installation cost will take seven years. Comparing his electric, gas, and heating oil bills from October through December of 2007 to his electric and gas bills for the same three months in 2008, the 2008 bills were \$200 less. Mr. Zick wholeheartedly endorses the technology: "It's a great system in terms of what it can do and how it works, and it increases the resale value of your home."

### Energy Efficiency Measures

NSTAR offers free energy audits on request. Mr. Zick's participation in the audit program made him eligible for a seven year loan for up to \$10,000 at 0% APR. NSTAR's audit recommended a number of energy efficiency upgrades, including low-flow showerheads, energy efficient lightbulbs, and insulation for the whole house.

This is one of a series of case studies prepared by Solar Boston, a \$550,000 program launched in 2007 that aims to encourage widespread adoption of solar energy in Boston. For further information, visit our Solar Boston Interactive Map to see active renewable energy installations within the City and to calculate the solar potential of your own rooftop: <http://www.cityofboston.gov/climate/solar.asp>